



Testimony of  
Professor Kate Moran, University of Rhode Island  
Department of Ocean Engineering & Graduate School of Oceanography  
to the U.S. Senate Committee on Environment and Public Works Field  
Briefing

# Climate Change

*Credits: John King (URI); Isaac Ginis (URI) ; IPCC 2001 and 2007; James Hansen (NASA); Overpeck et al. 2006; NASA Images; Emanuel (2005)*



# Testimony Highlights

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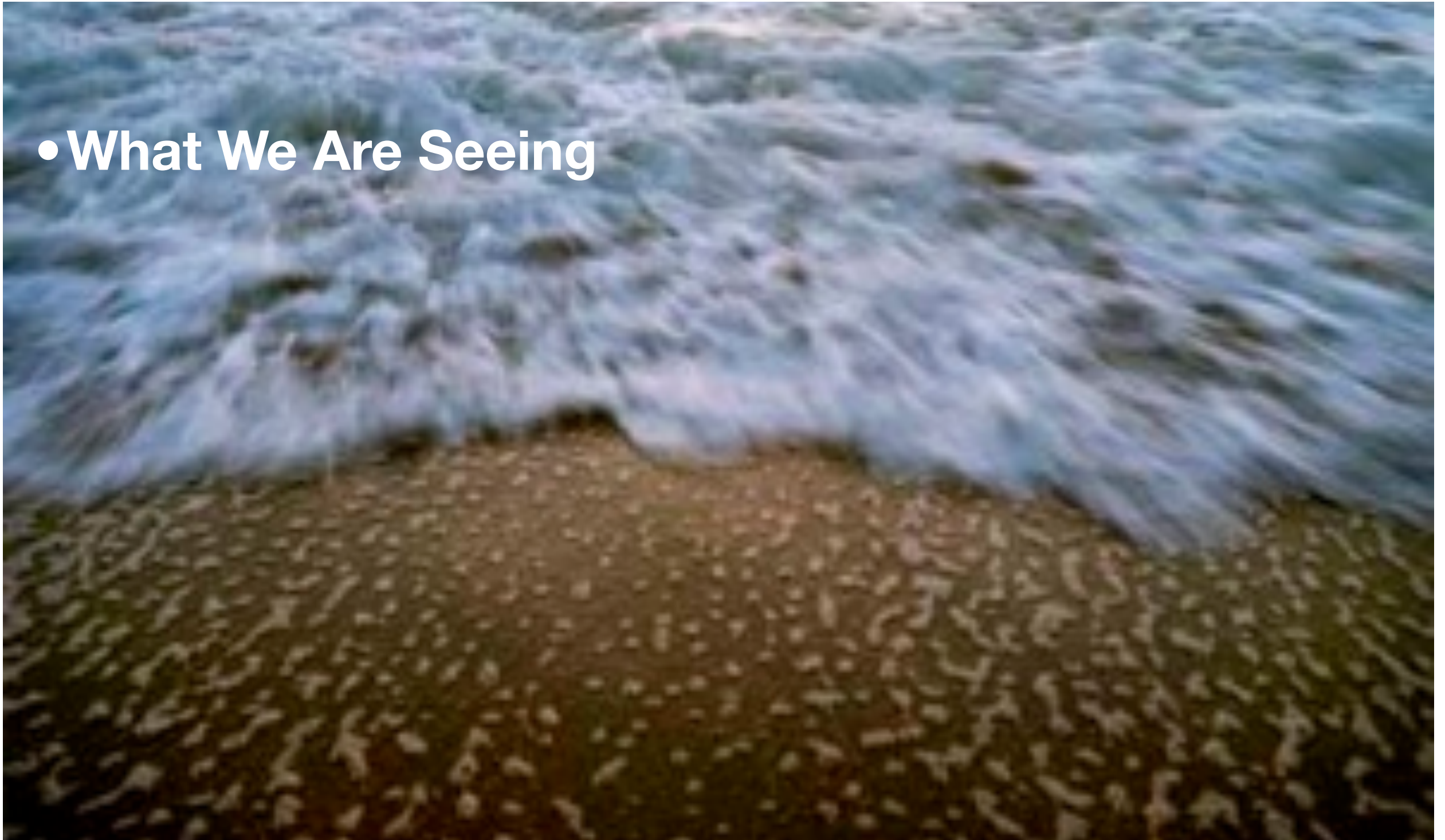




# Testimony Highlights

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- **What We Are Seeing**





# Testimony Highlights

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- **What We Are Seeing**
- **Predictions**





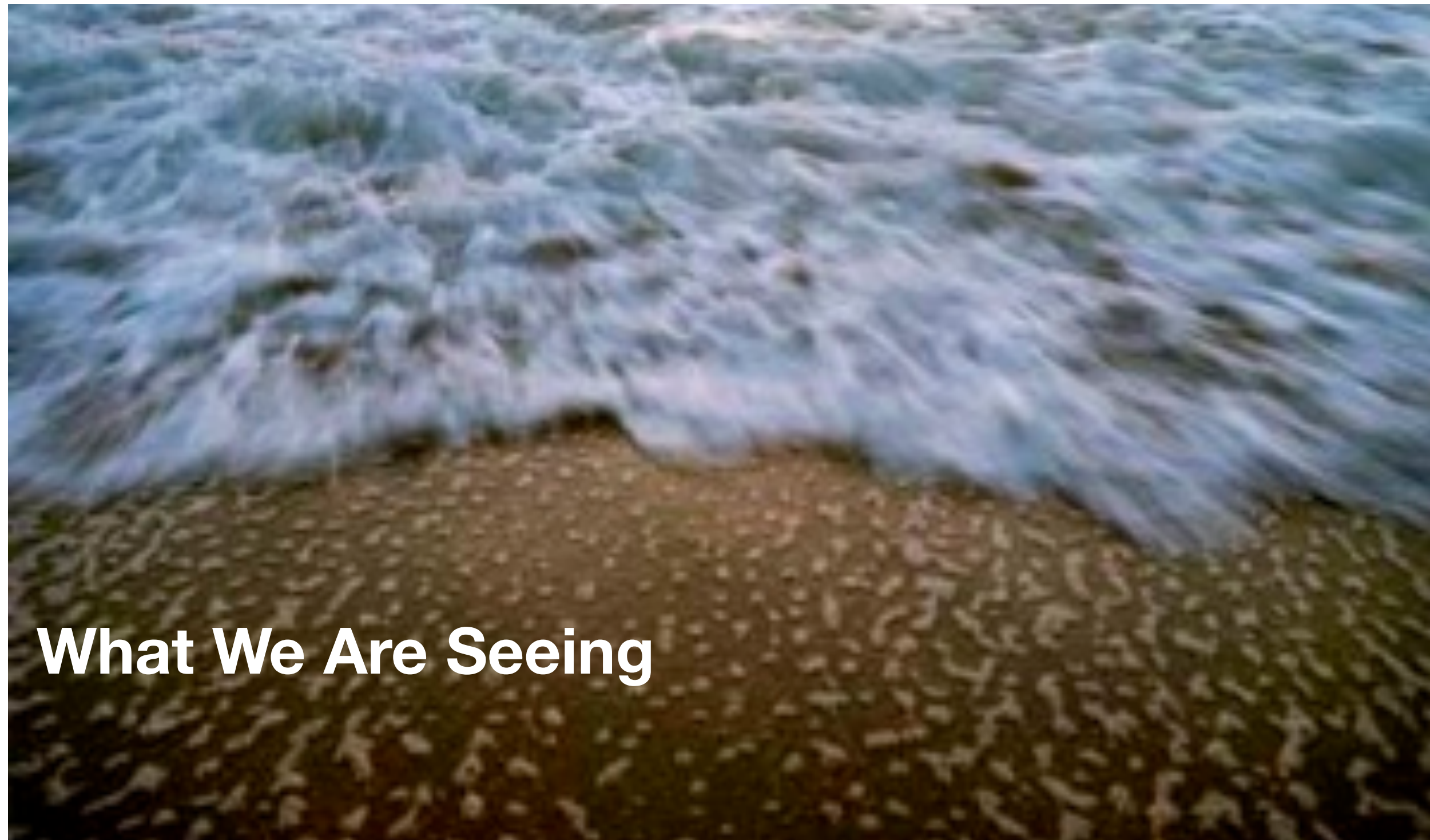
# Testimony Highlights

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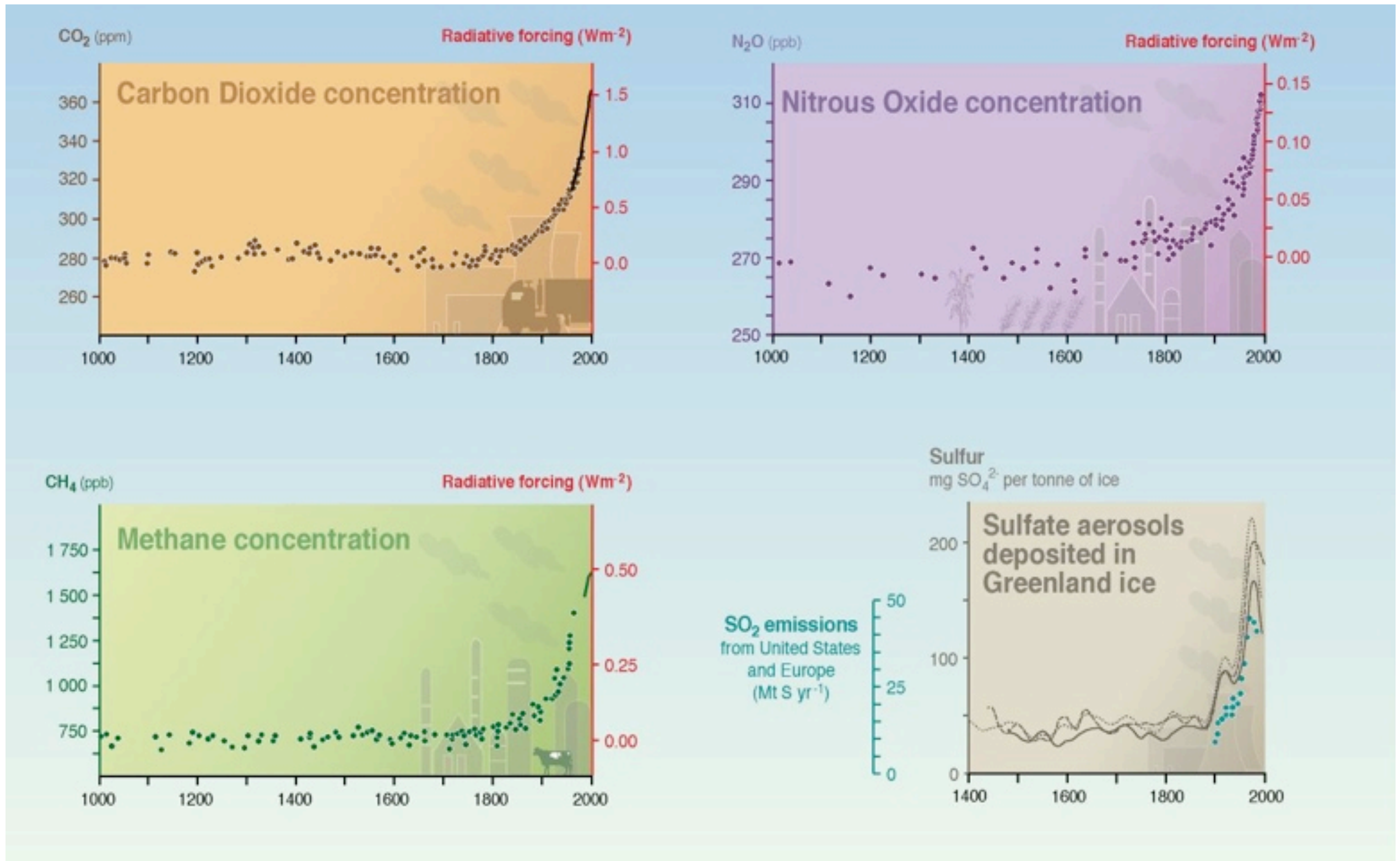
- **What We Are Seeing**
- **Predictions**
- **Uncertainty**





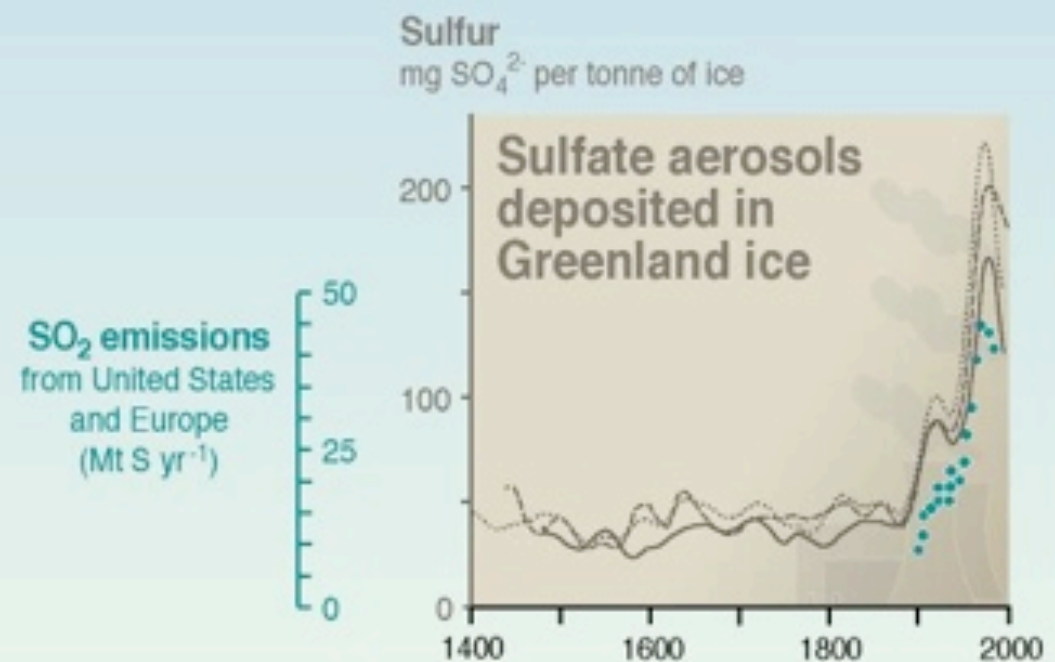
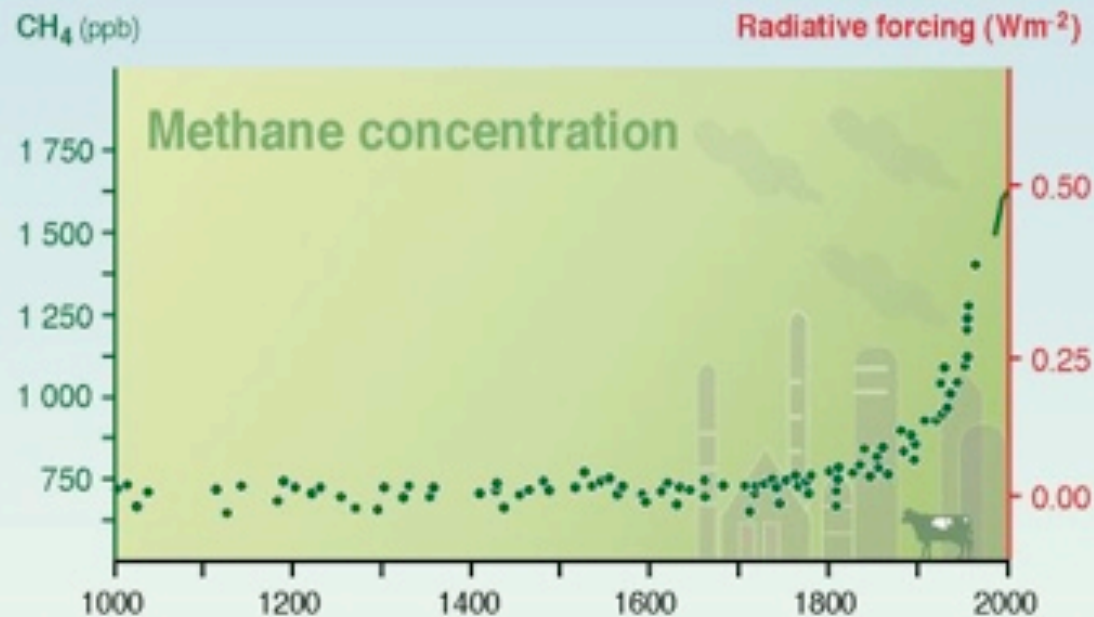
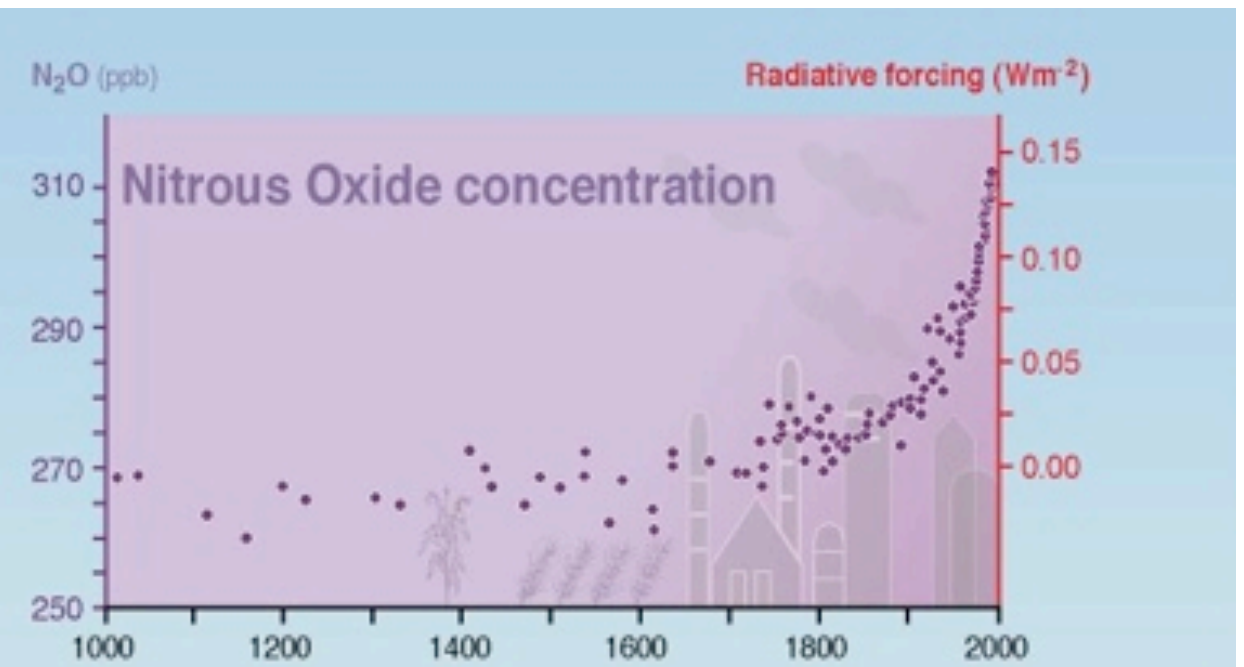


# Global Change - We are the Cause.....



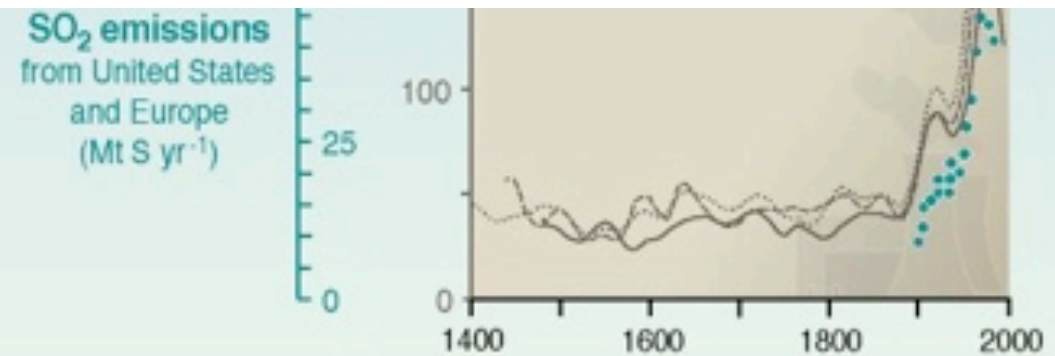
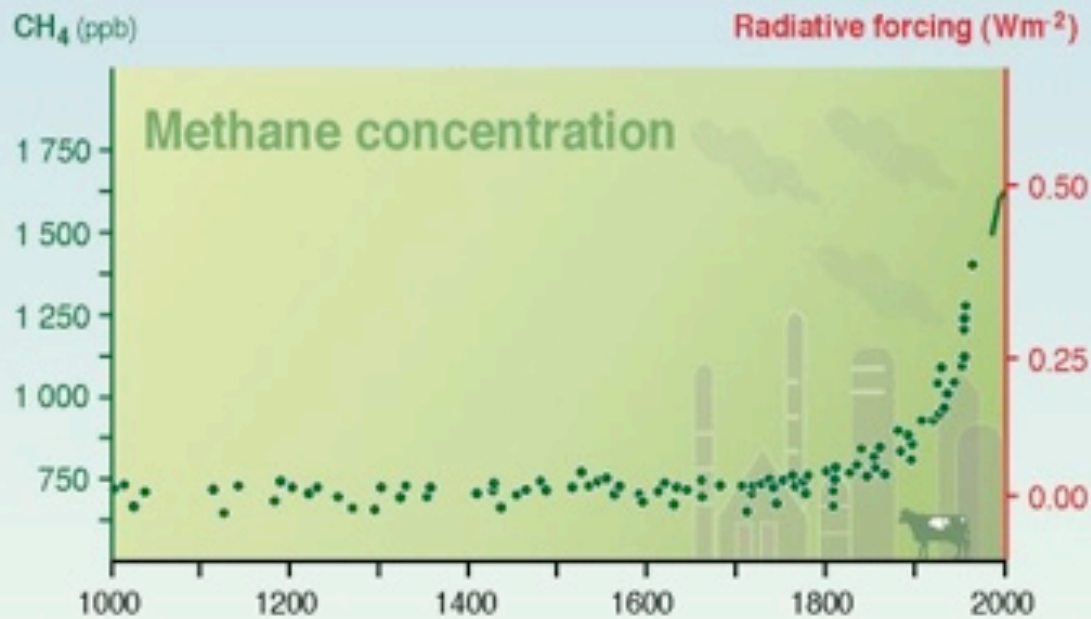


# Global Change - We are the Cause.....



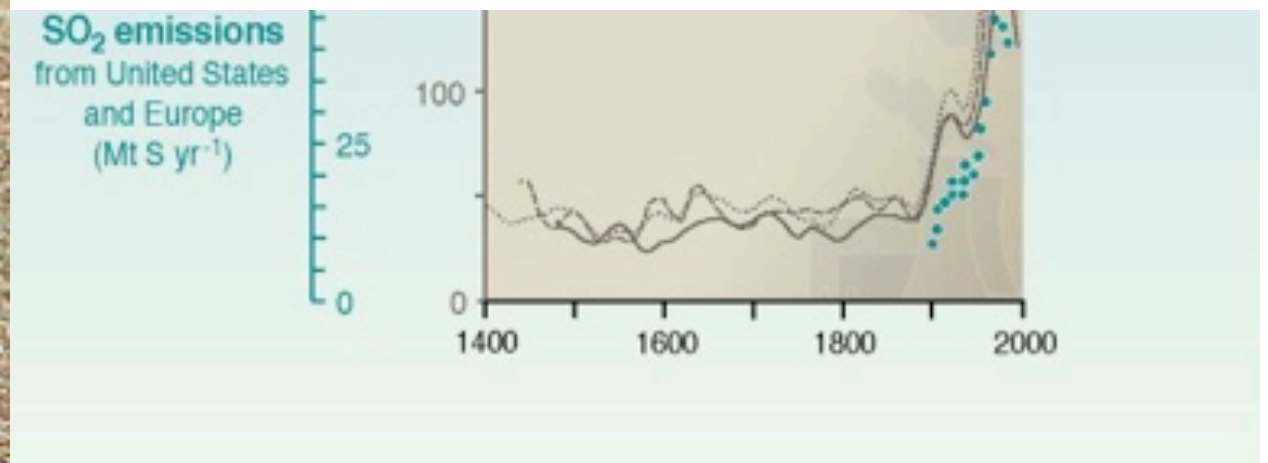


# Global Change - We are the Cause.....





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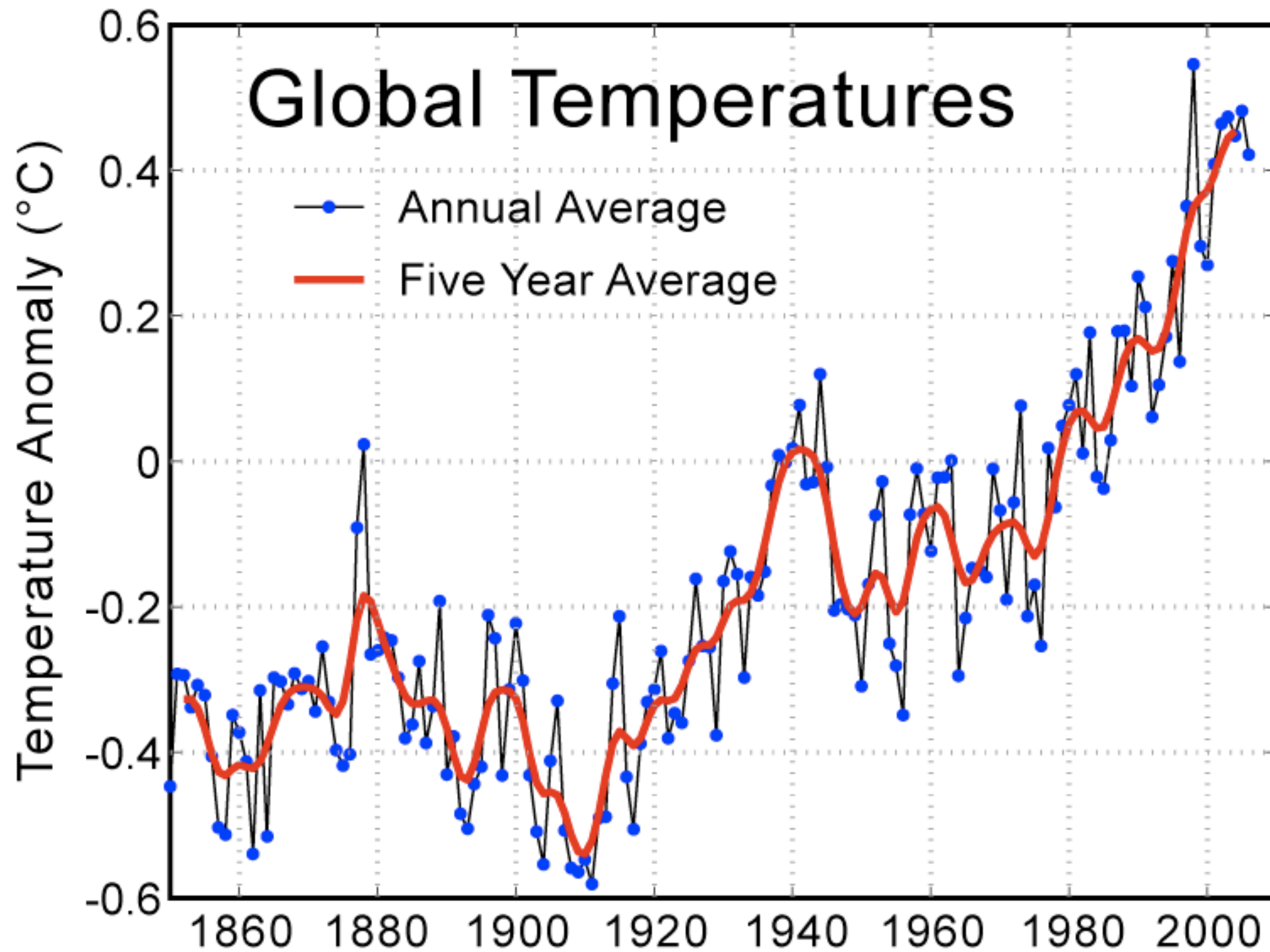
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# Warming.....

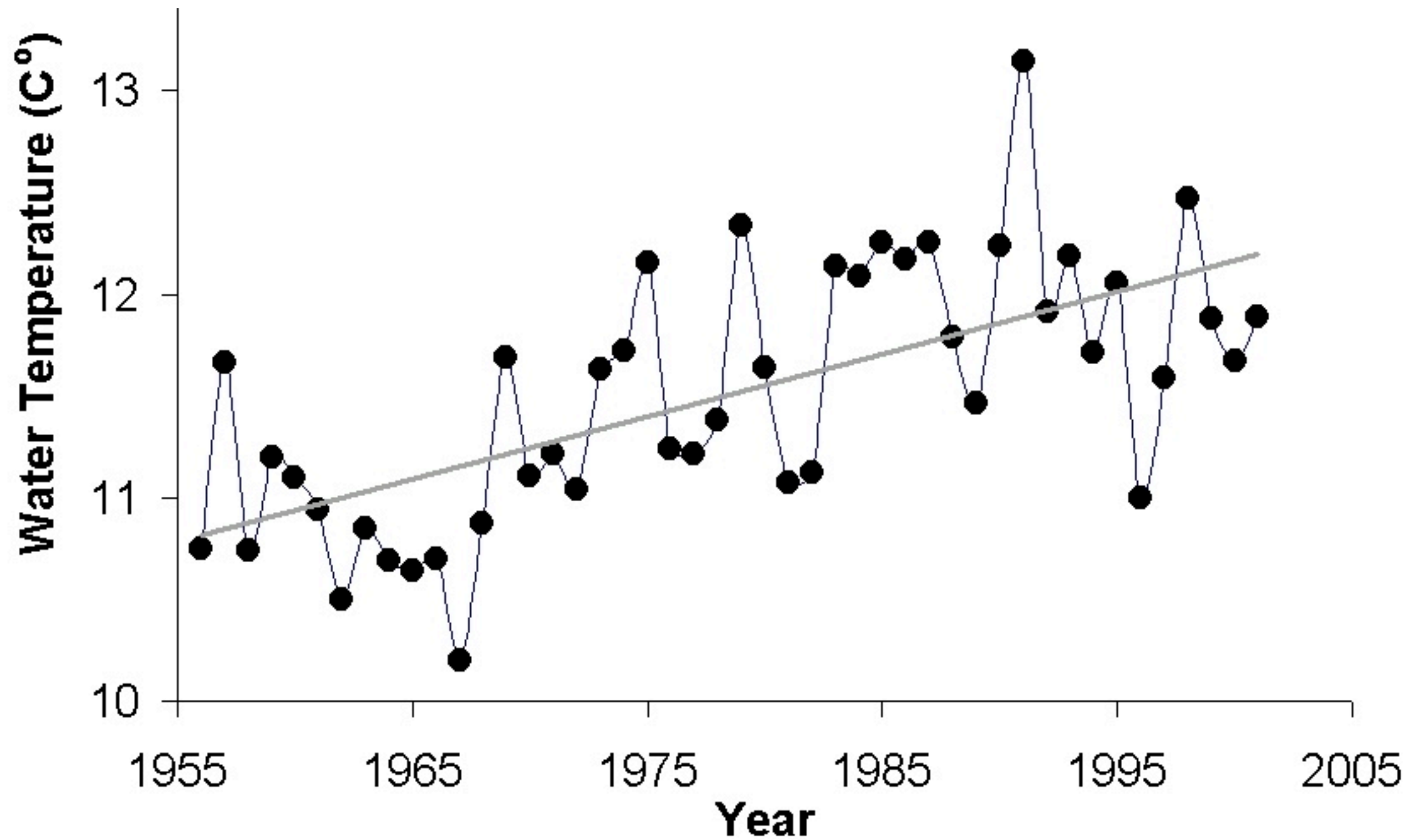
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And Here at Home.....

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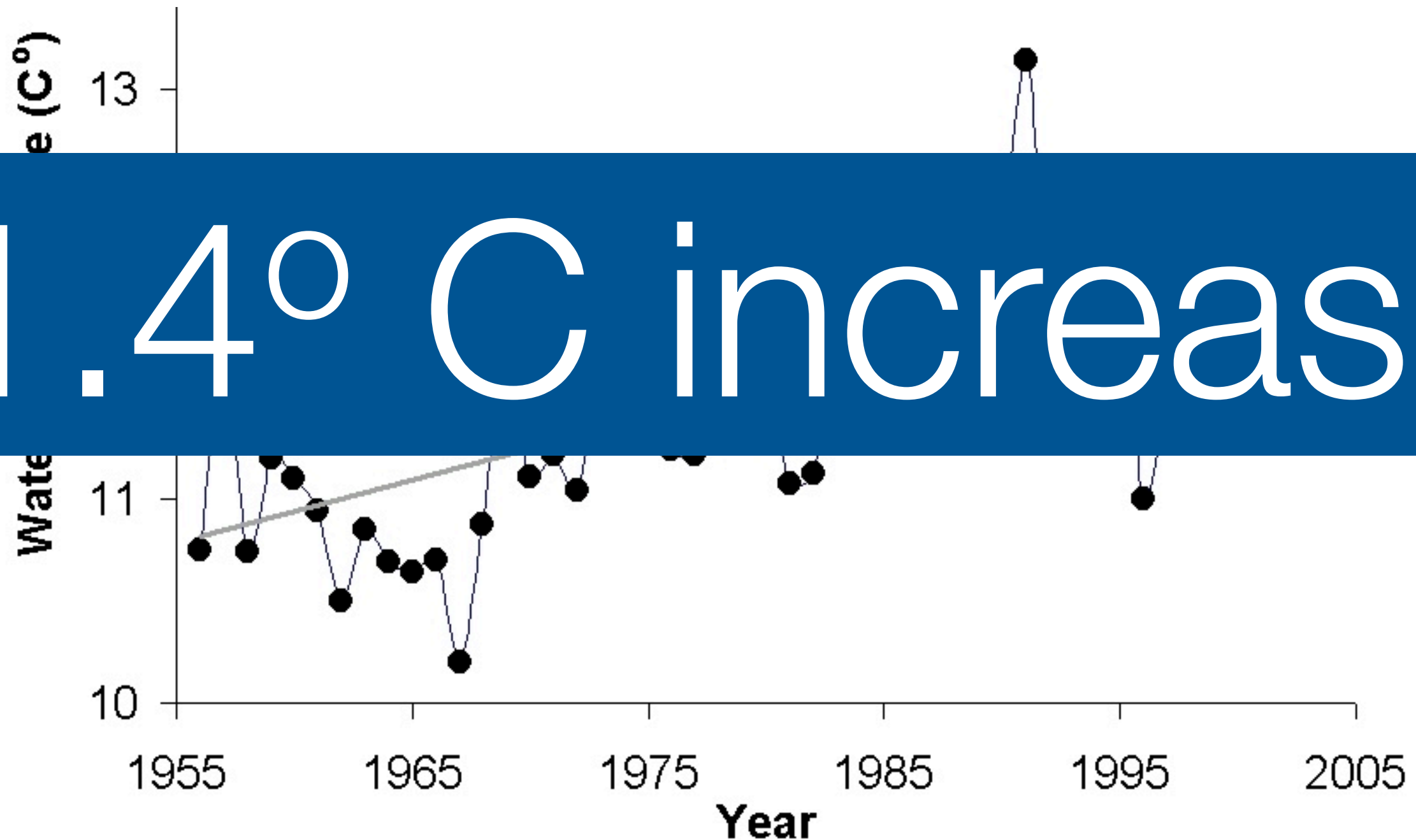




And Here at Home.....

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1.4° C increase





And Here at Home.....

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# Impacts Rhode Island's Economy

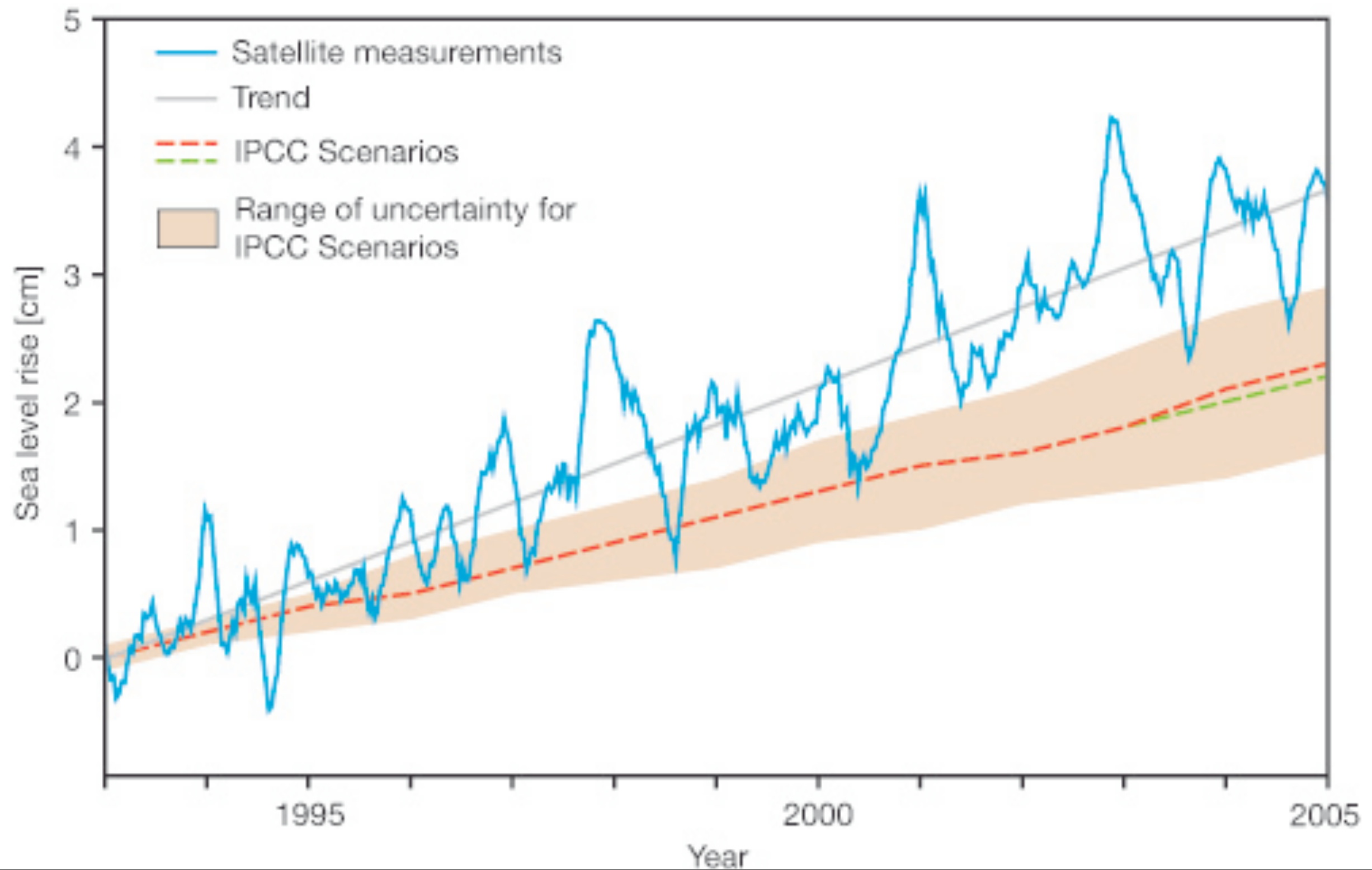


# Sea Level.....

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# Sea Level.....



# Loss of Earth's Natural Air Conditioning

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# Loss of Earth's Natural Air Conditioning

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# Loss of Earth's Natural Air Conditioning

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# IPCC 2007 Documents Observations.....

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- Surface temperatures increasing
- Tropospheric temperatures increasing
- Atmospheric water vapour content increasing
- Ocean heat content increasing .....now directly linked to sea level rise
- Greenland and Antarctic Ice Sheets losing mass
- Glaciers and snow cover decreasing
- Arctic sea ice extent decreasing
- Area of seasonally frozen ground decreasing
- Mid-latitude wind patterns/ storm tracks shifting poleward
- More intense and longer droughts
- Frequency of heavy precipitation events increasing
- Extreme temperatures increasing
- Tropical cyclone intensity increasing



# IPCC 2007 Documents Observations.....

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- Tropospheric temperatures increasing
- Atmospheric water vapour content increasing
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- Gla
- Arc
- Are
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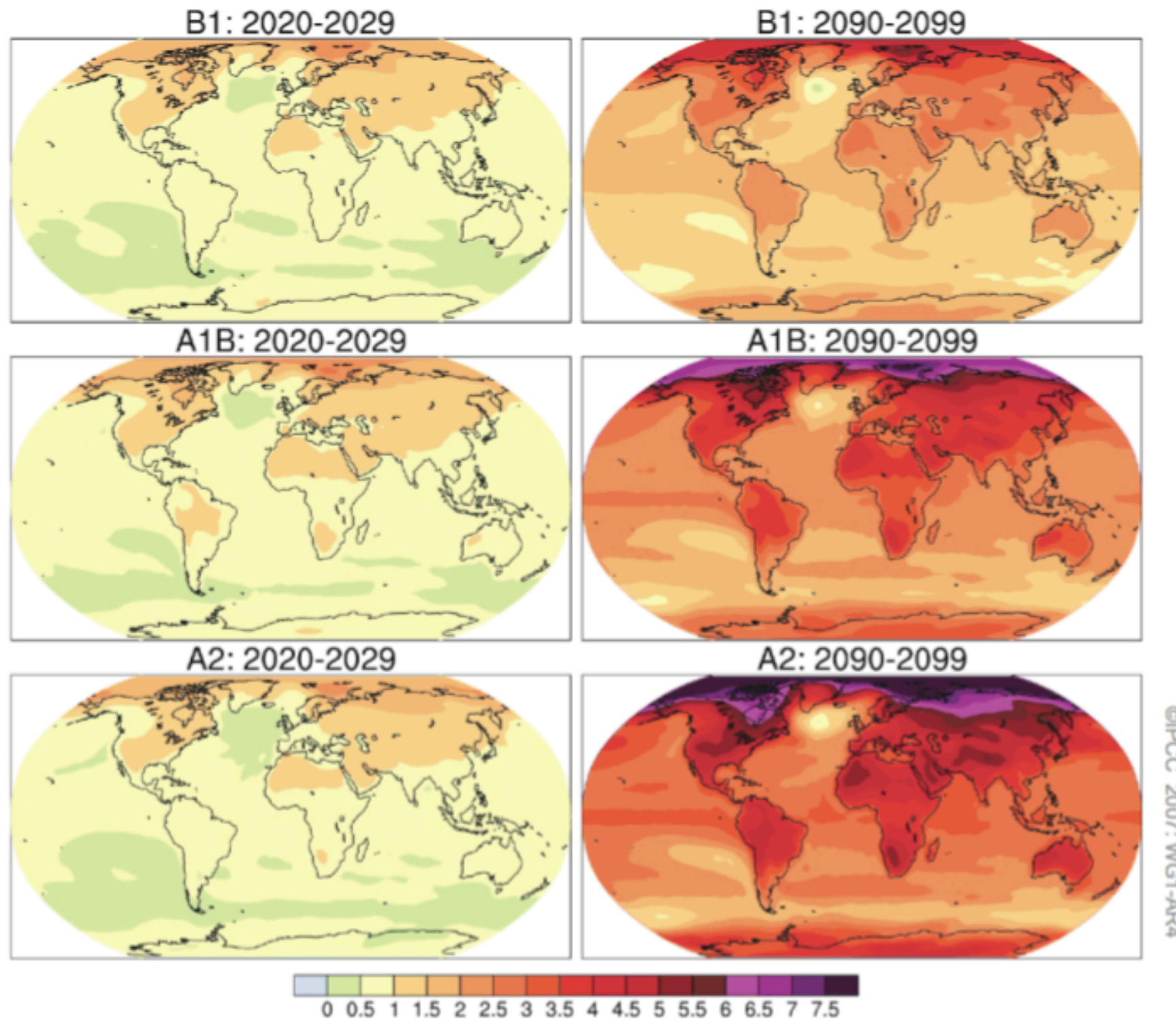
Unequivocal



**Predictions**



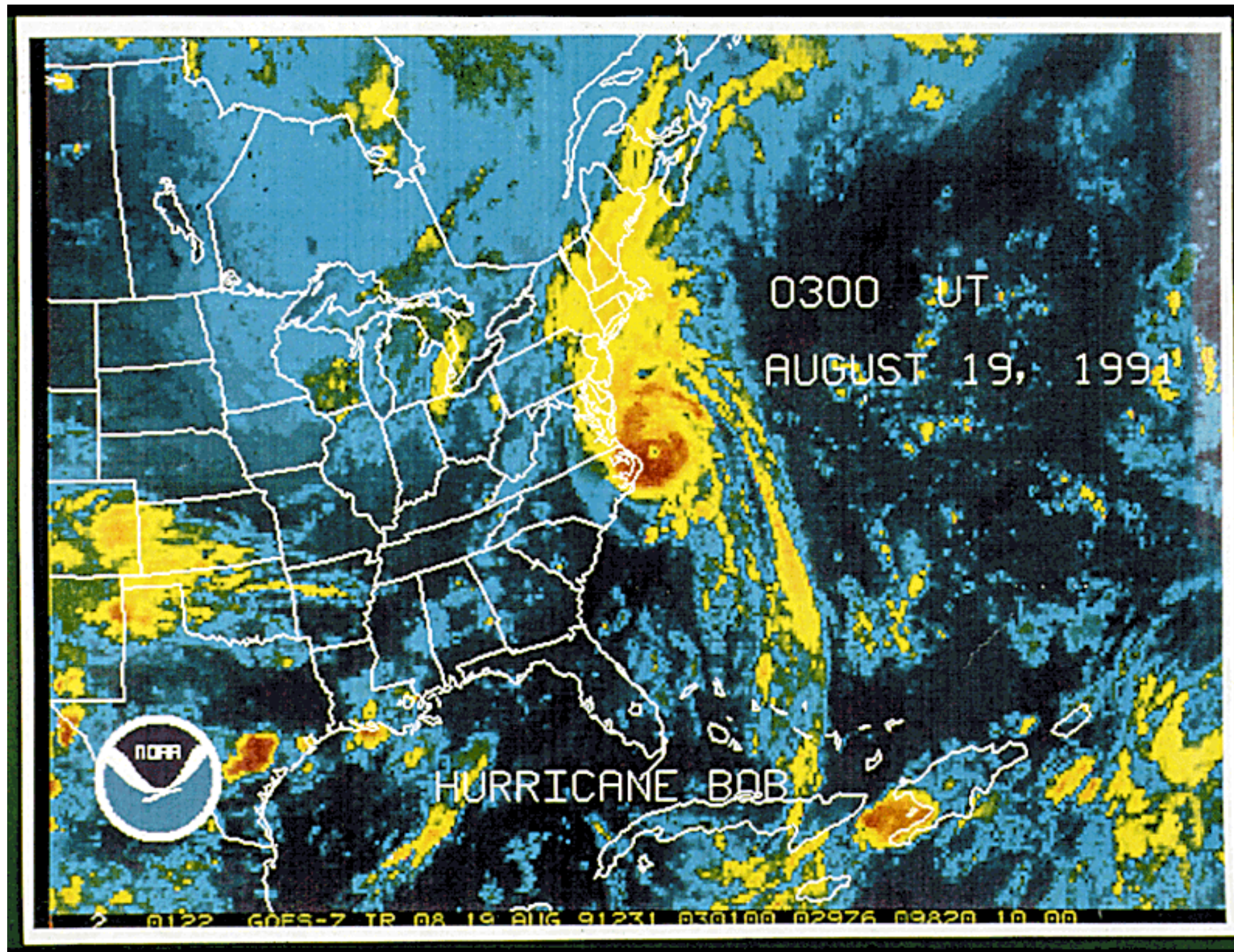
# Continued Warming....





# Hurricanes....

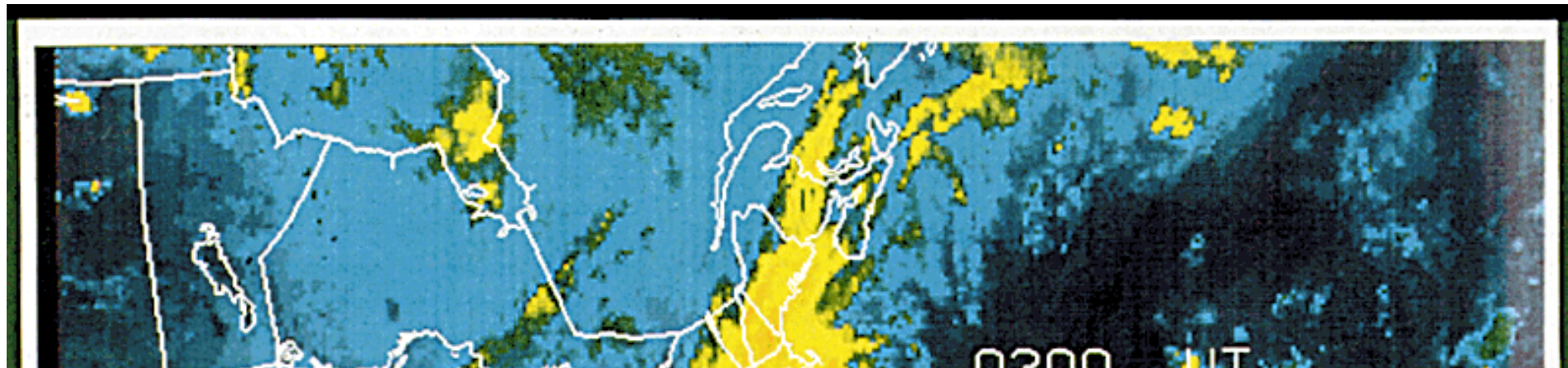
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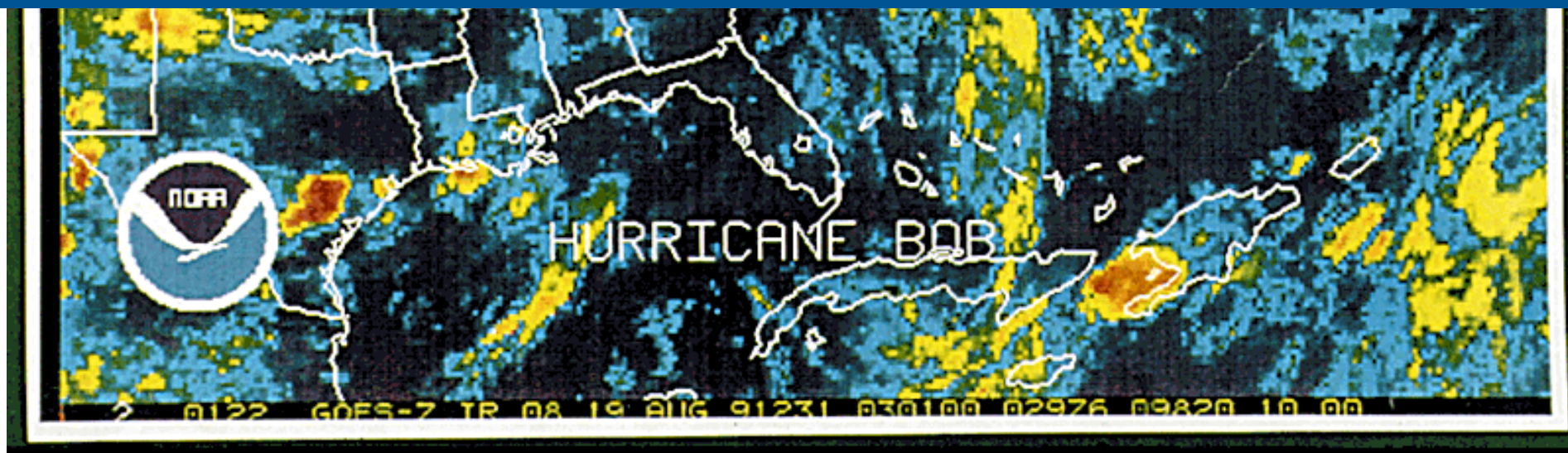


Hurricanes....

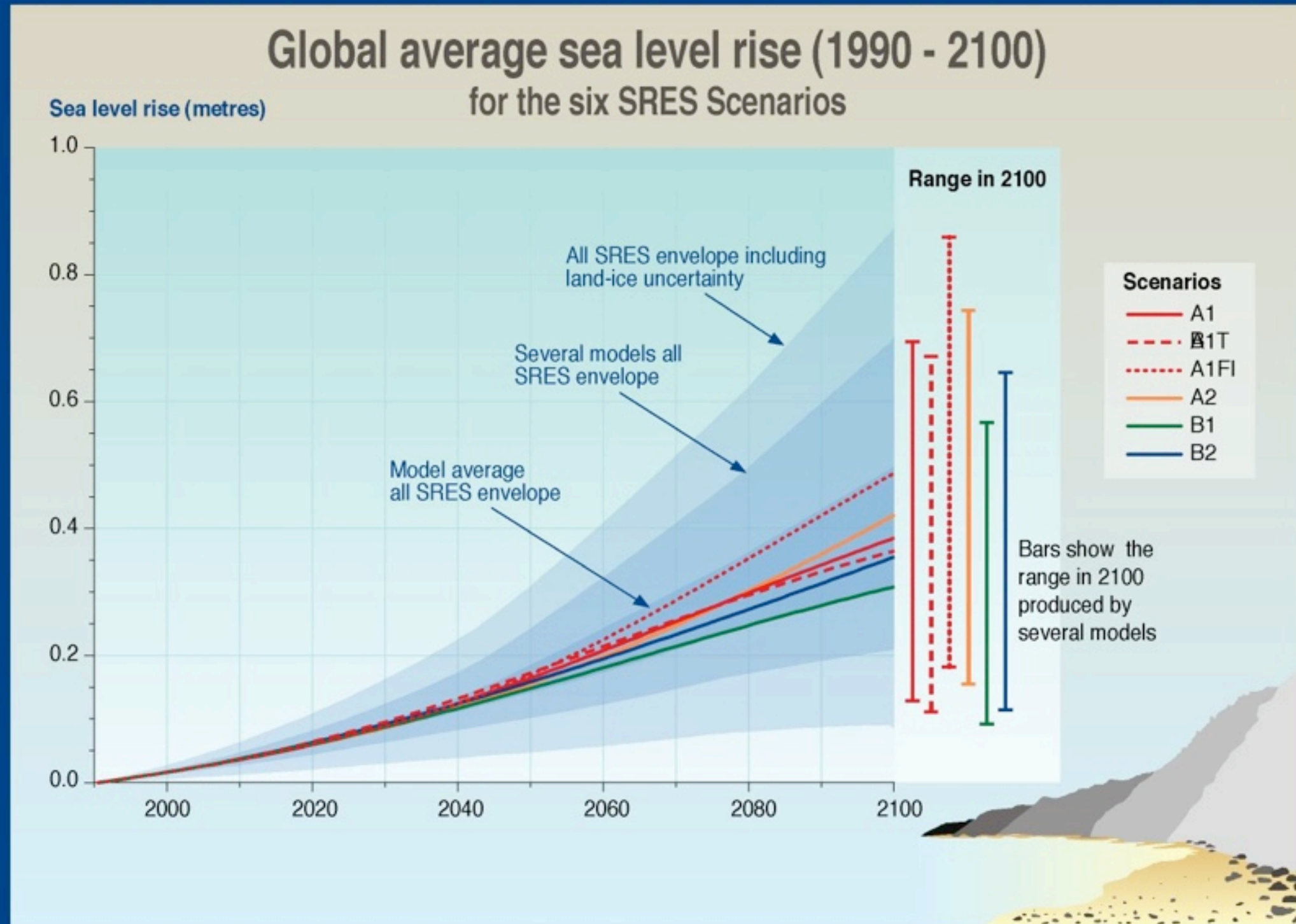
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Ongoing.....

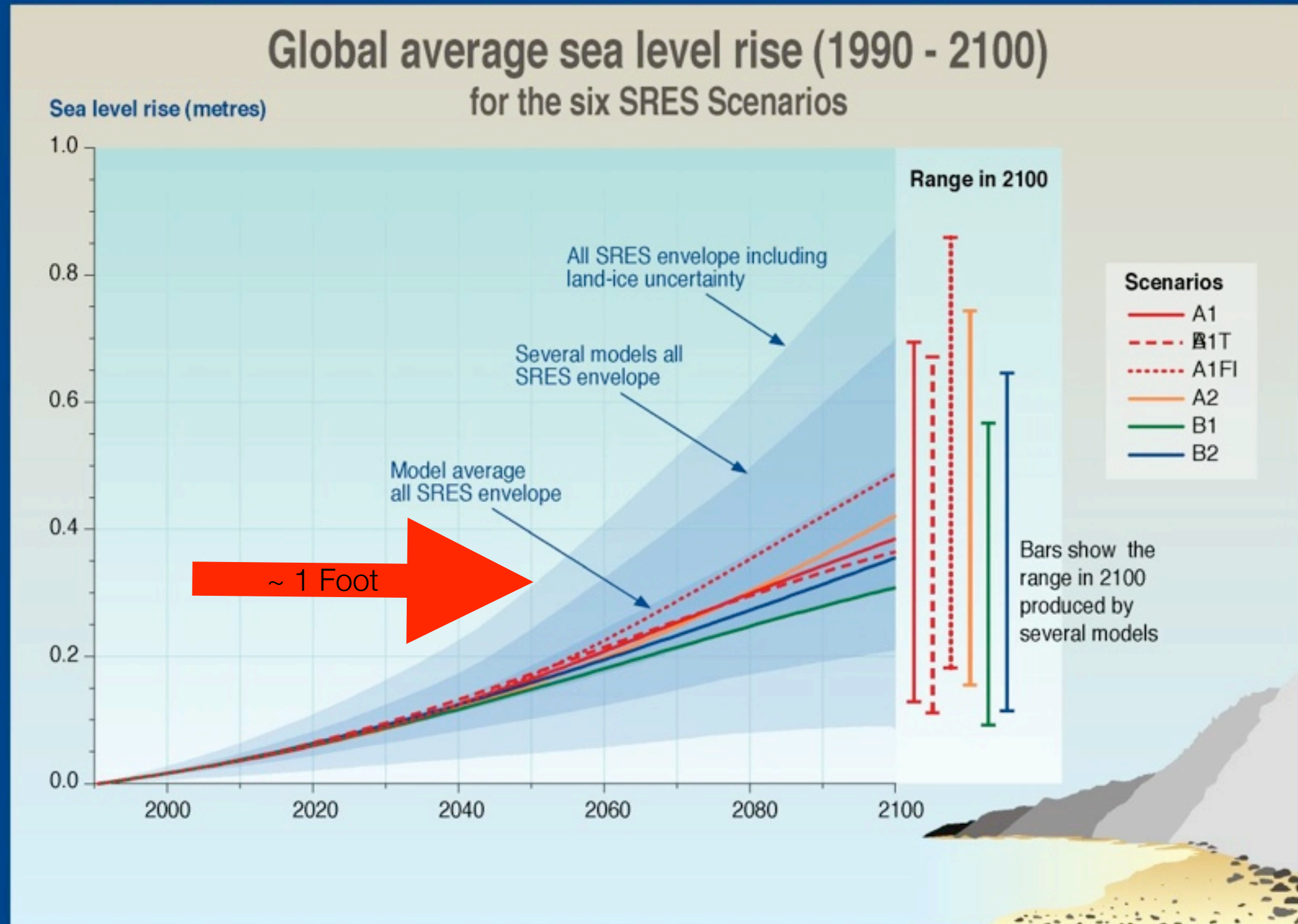


# Sea Level





# Sea Level

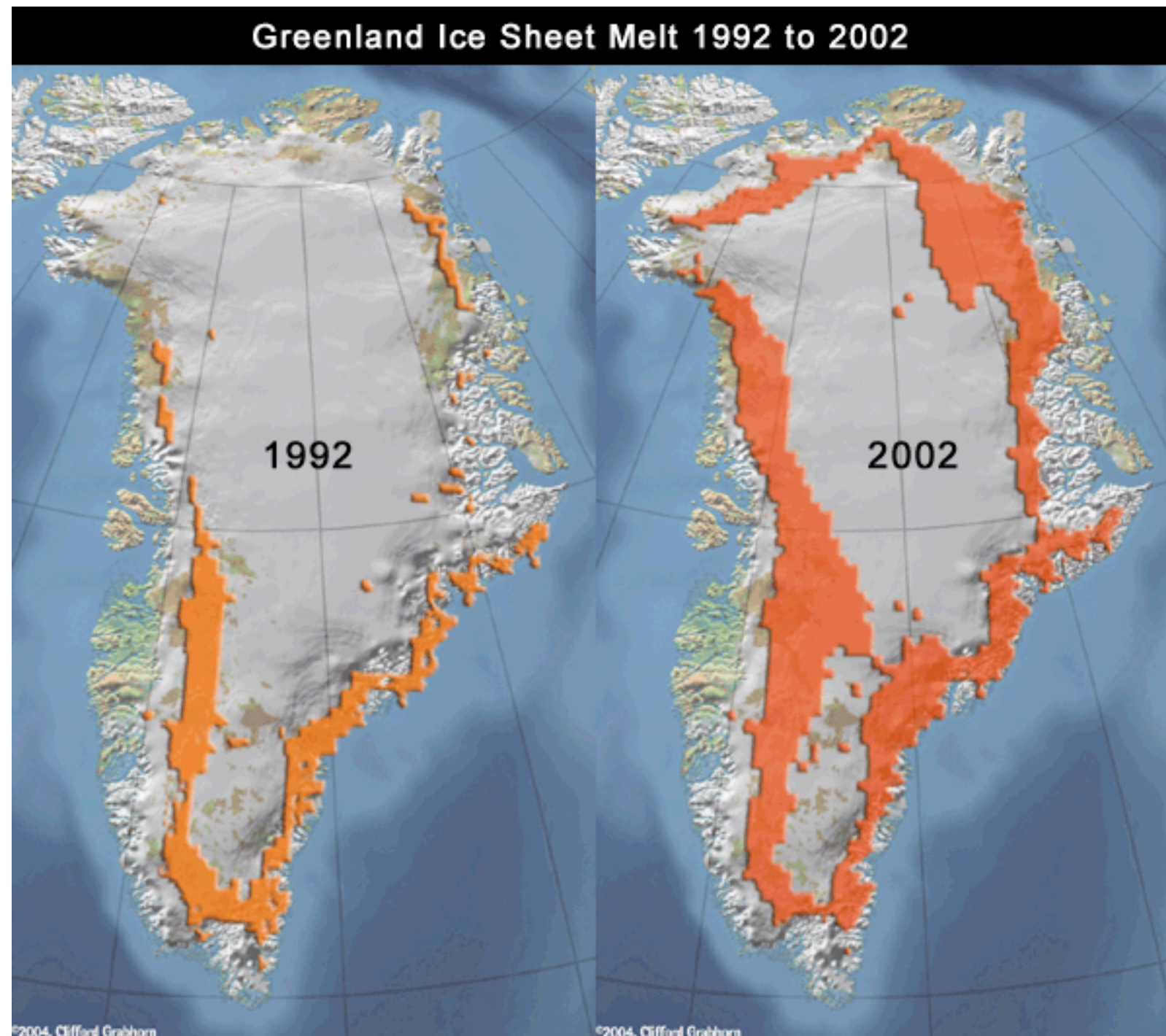




**Uncertainty**



But....



But....

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And....

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# Sea Level Uncertainty

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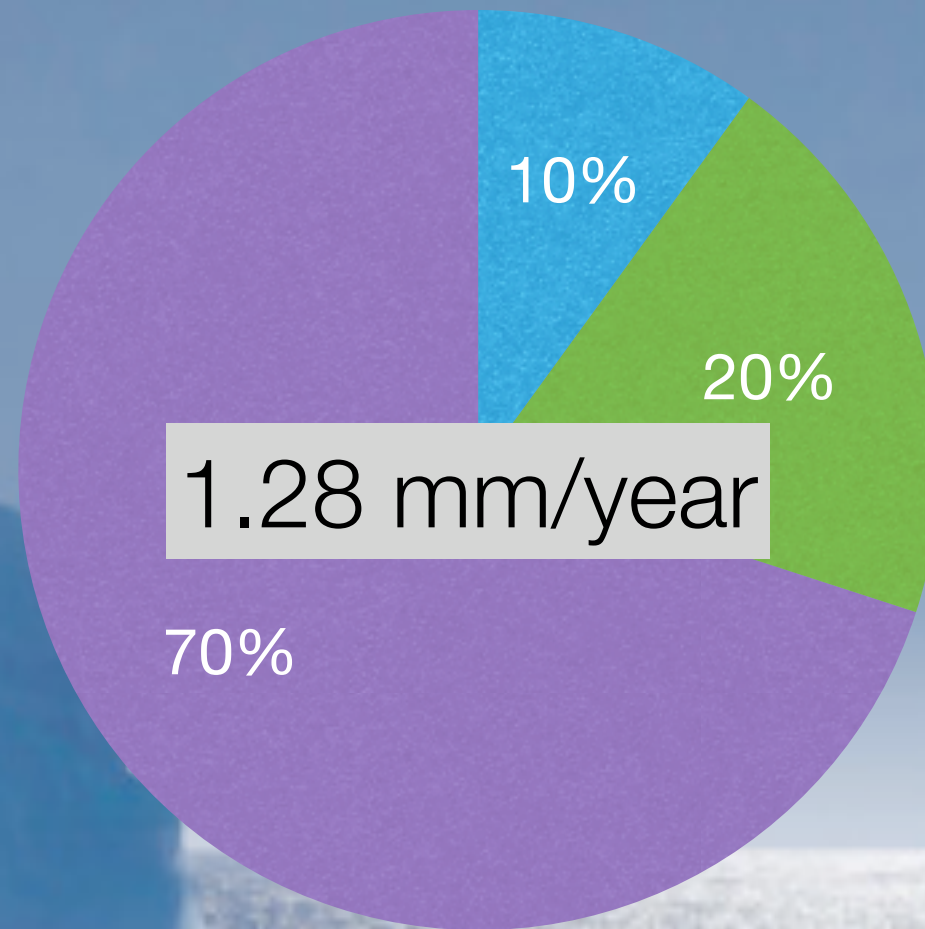




# Sea Level Uncertainty

2006

IPCC, 2006



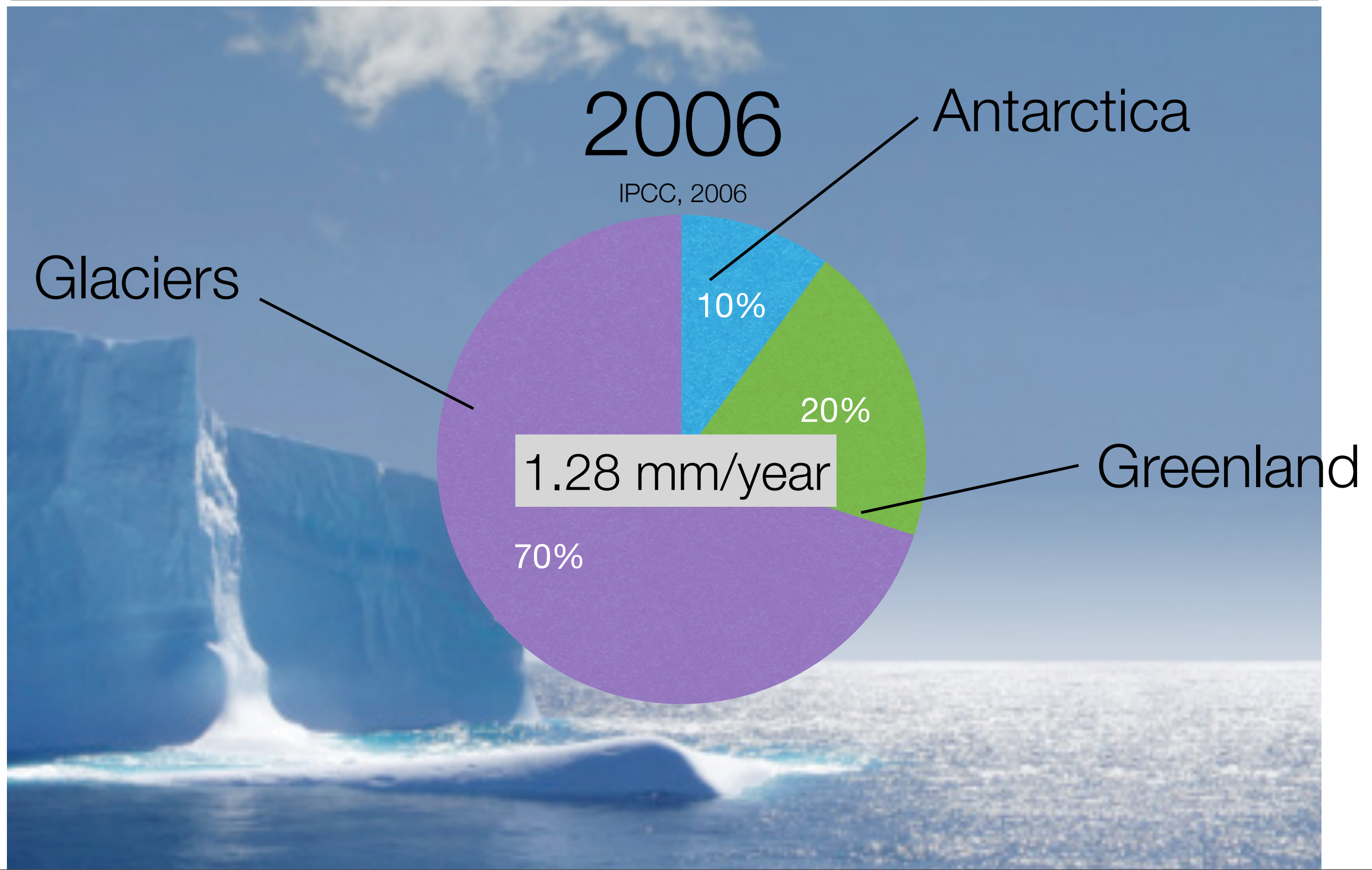
1.28 mm/year

70%

10%

20%

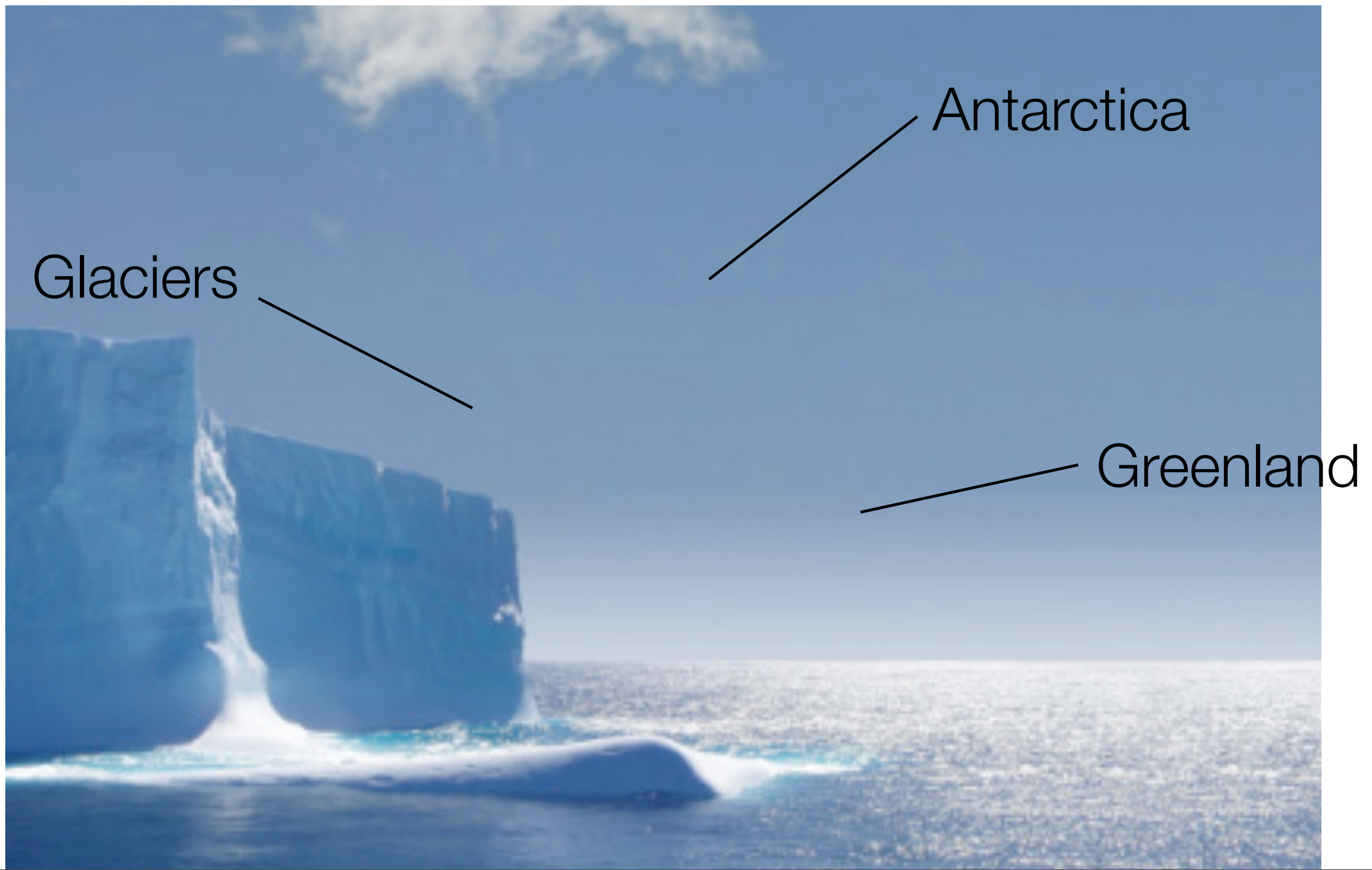
# Sea Level Uncertainty





# Sea Level Uncertainty

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# Sea Level Uncertainty

2007

Meier et al. 2007

Antarctica

10%

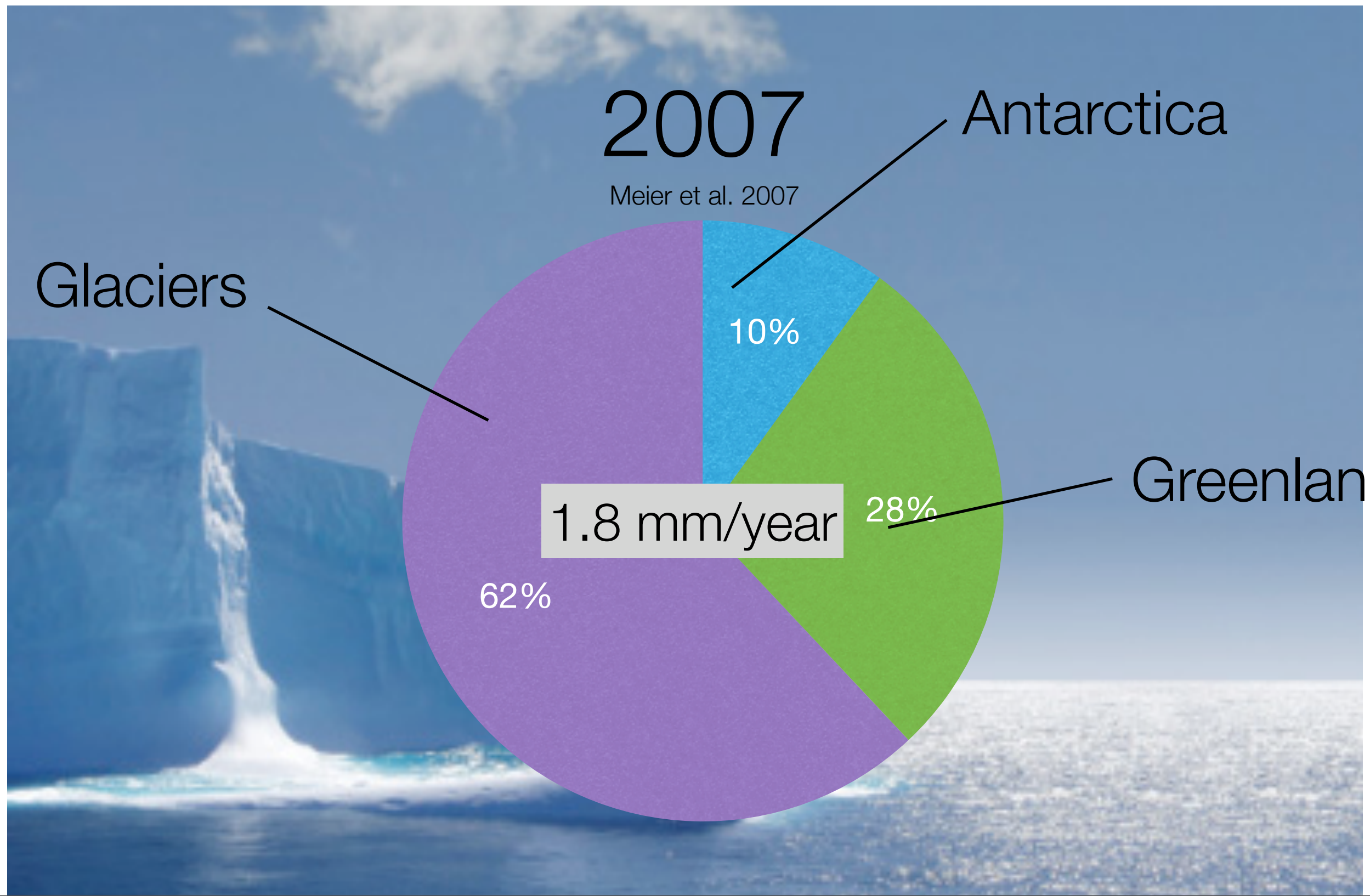
Glaciers

62%

1.8 mm/year

28%

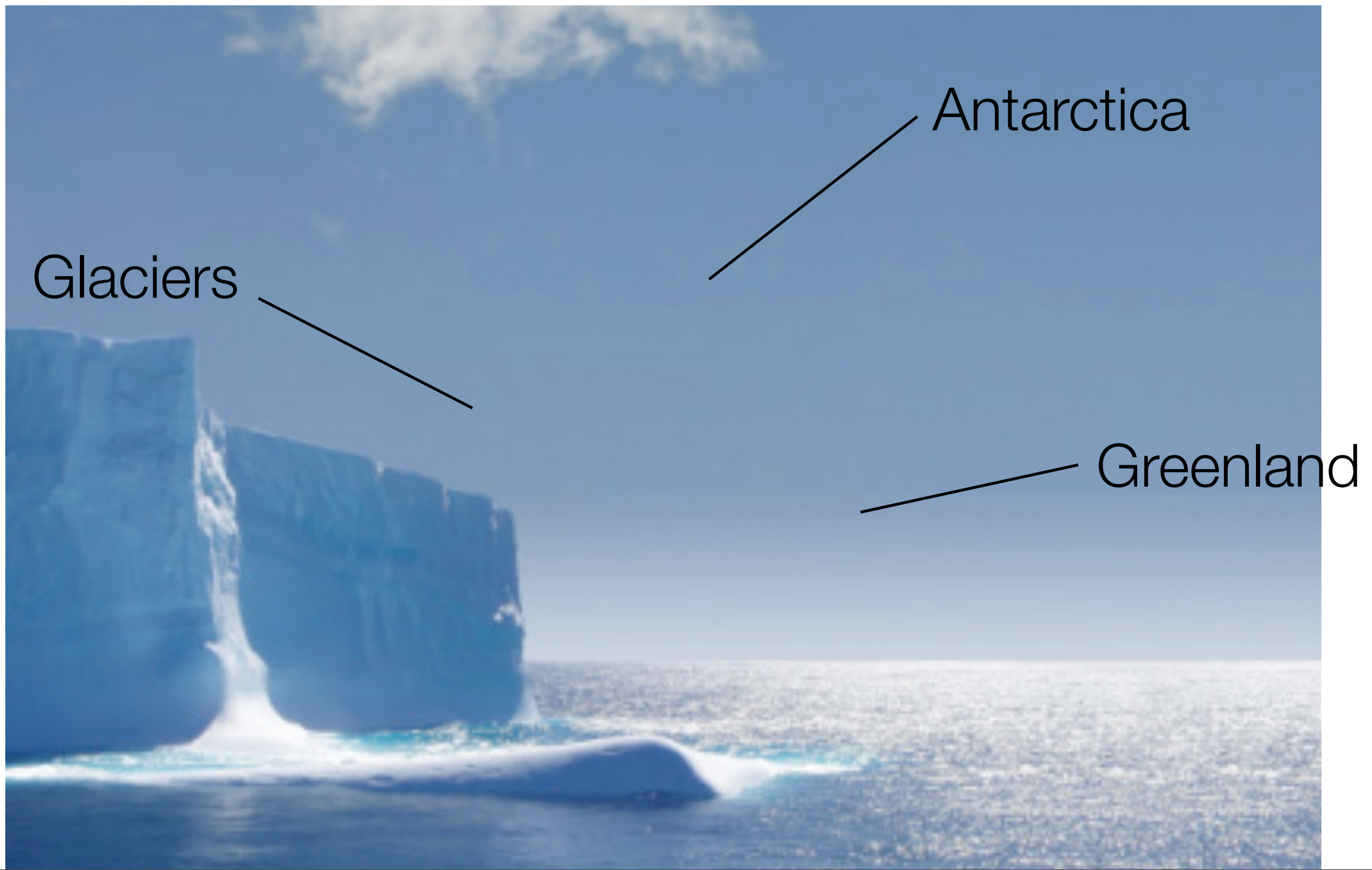
Greenland





# Sea Level Uncertainty

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# Sea Level Uncertainty

2008

GRACE data

Antarctica

20%

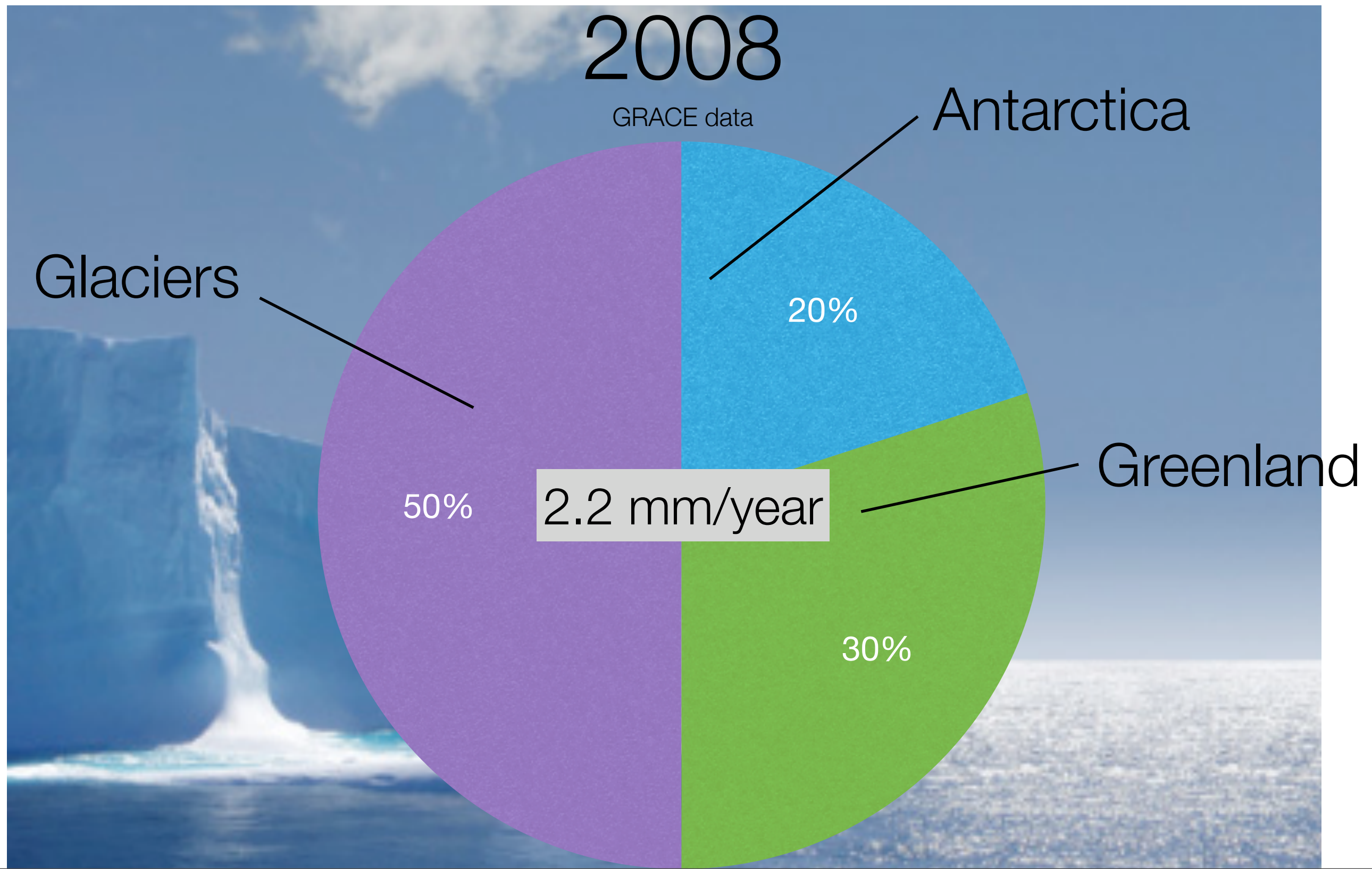
Greenland

30%

50%

2.2 mm/year

Glaciers





Take Home...





## Take Home...

- **Narragansett Bay already seeing affects of climate change**





## Take Home...

- **Narragansett Bay already seeing affects of climate change**
- **Sea level rise will occur - timing & amount still uncertain**



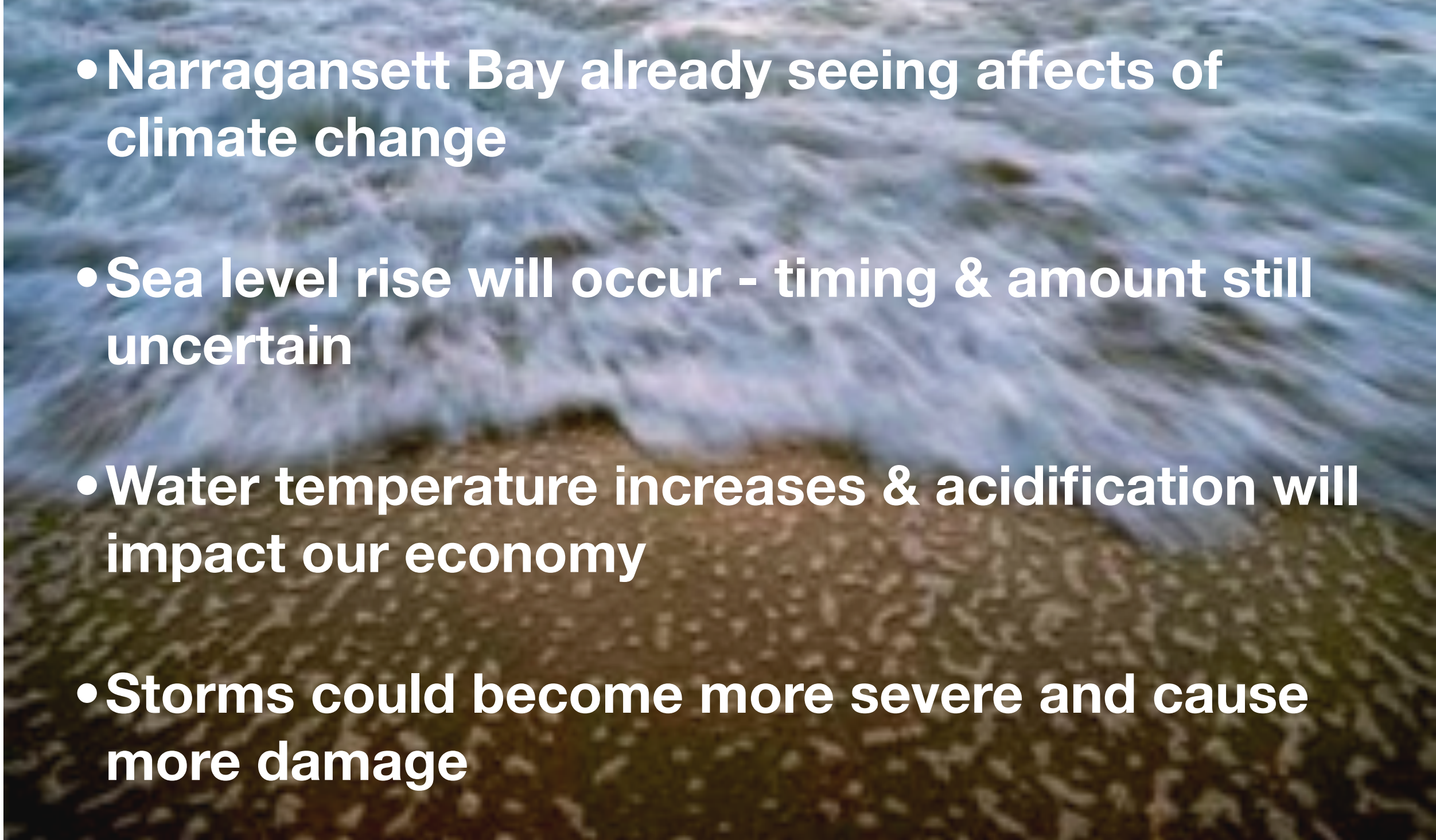


## Take Home...

- **Narragansett Bay already seeing affects of climate change**
- **Sea level rise will occur - timing & amount still uncertain**
- **Water temperature increases & acidification will impact our economy**



## Take Home...

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- **Narragansett Bay already seeing affects of climate change**
  - **Sea level rise will occur - timing & amount still uncertain**
  - **Water temperature increases & acidification will impact our economy**
  - **Storms could become more severe and cause more damage**





**We cannot afford to do nothing....**